

## 1. General description

Silicon Carbide Schottky diode in a DFN 8\*8 plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- Highly stable switching performance
- High forward surge capability IFSM
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant

## 3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

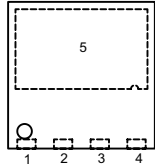
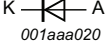
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                     | Values |     |     |     | Unit |
|-------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------|-----|-----|-----|------|
| Absolute maximum rating |                                 |                                                                                                                                |        |     |     |     |      |
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                | 650    |     |     |     | V    |
| I <sub>F(AV)</sub>      | average forward current         | δ = 0.5 ; square-wave pulse; T <sub>c</sub> ≤ 136 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | 8      |     |     |     | A    |
| T <sub>j</sub>          | junction temperature            |                                                                                                                                | 175    |     |     |     | °C   |
| Symbol                  | Parameter                       | Conditions                                                                                                                     |        | Min | Typ | Max | Unit |
| Static characteristics  |                                 |                                                                                                                                |        |     |     |     |      |
| V <sub>F</sub>          | forward voltage                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>                                                           |        | -   | 1.5 | 1.7 | V    |
|                         |                                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>                                                          |        | -   | 1.8 | 2.1 | V    |
| Dynamic characteristics |                                 |                                                                                                                                |        |     |     |     |      |
| Q <sub>r</sub>          | recovered charge                | I <sub>F</sub> = 8 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>   |        | -   | 13  | -   | nC   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline                                                                 | Graphic symbol                                                                      |
|-----|--------|-------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | n.c.   | not connected                       |  |  |
| 2   | n.c.   | not connected                       |                                                                                    |                                                                                     |
| 3   | A      | anode                               |                                                                                    |                                                                                     |
| 4   | A      | anode                               |                                                                                    |                                                                                     |
| 5   | K      | mounting base; connected to cathode |                                                                                    |                                                                                     |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC08650T  | DFN8*8       | WNSC08650T6J          | Tape           | 3000                   | DFN8X8N         | 25-Dec-2019        |

## 7. Marking

Table 4. Marking codes

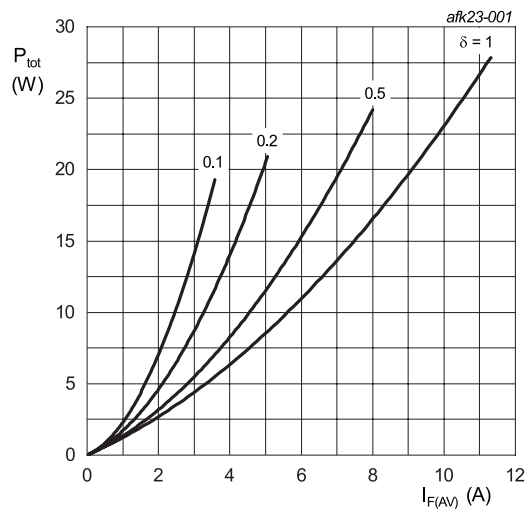
| Type number | Marking codes  |
|-------------|----------------|
| WNSC08650T  | WNSC<br>08650T |

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

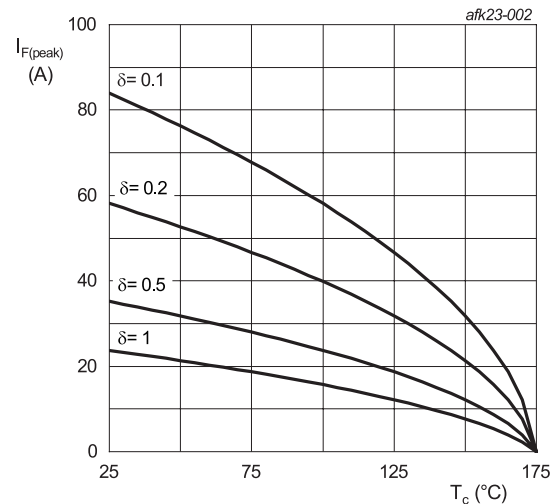
| Symbol           | Parameter                           | Conditions                                                                                  | Values     | Unit                 |
|------------------|-------------------------------------|---------------------------------------------------------------------------------------------|------------|----------------------|
| $V_{RRM}$        | repetitive peak reverse voltage     |                                                                                             | 650        | V                    |
| $V_{RWM}$        | crest working reverse voltage       |                                                                                             | 650        | V                    |
| $V_R$            | reverse voltage                     | DC                                                                                          | 650        | V                    |
| $I_{F(AV)}$      | average forward current             | $\delta = 0.5$ ; square-wave pulse; $T_c \leq 136^\circ\text{C}$ ; Fig. 1; Fig. 2; Fig. 3   | 8          | A                    |
| $I_{FRM}$        | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_c \leq 153^\circ\text{C}$ ; square-wave pulse | 16         | A                    |
| $I_{FSM}$        | non-repetitive peak forward current | $t_p = 10\ \text{ms}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; sine-wave pulse           | 48         | A                    |
|                  |                                     | $t_p = 10\ \mu\text{s}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; square-wave pulse       | 385        | A                    |
| $I^2t$           | $I^2t$ for fusing                   | sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 10\ \text{ms}$            | 12         | $\text{A}^2\text{s}$ |
| $T_{\text{stg}}$ | storage temperature                 |                                                                                             | -55 to 175 | $^\circ\text{C}$     |
| $T_j$            | junction temperature                |                                                                                             | 175        | $^\circ\text{C}$     |



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_o = 1.108\ \text{V}; R_s = 0.1198\ \Omega$$

**Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values**



**Fig. 2. Current derating as a function of case temperature**

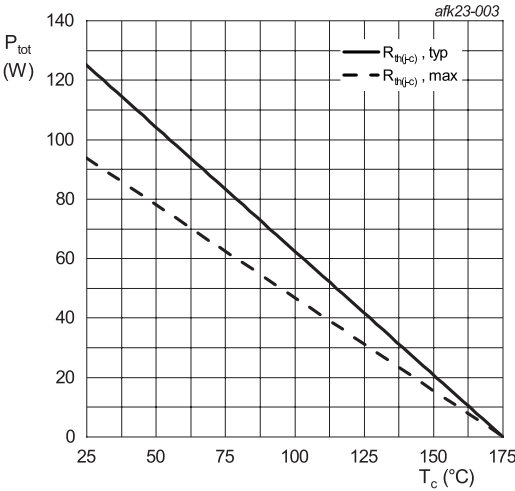


Fig. 3. Total power dissipation as a function of case temperature

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol        | Parameter                                            | Conditions             |  | Min | Typ | Max | Unit |
|---------------|------------------------------------------------------|------------------------|--|-----|-----|-----|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case             | <a href="#">Fig. 4</a> |  | -   | 1.2 | 1.6 | K/W  |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air            |  | -   | 50  | -   | K/W  |

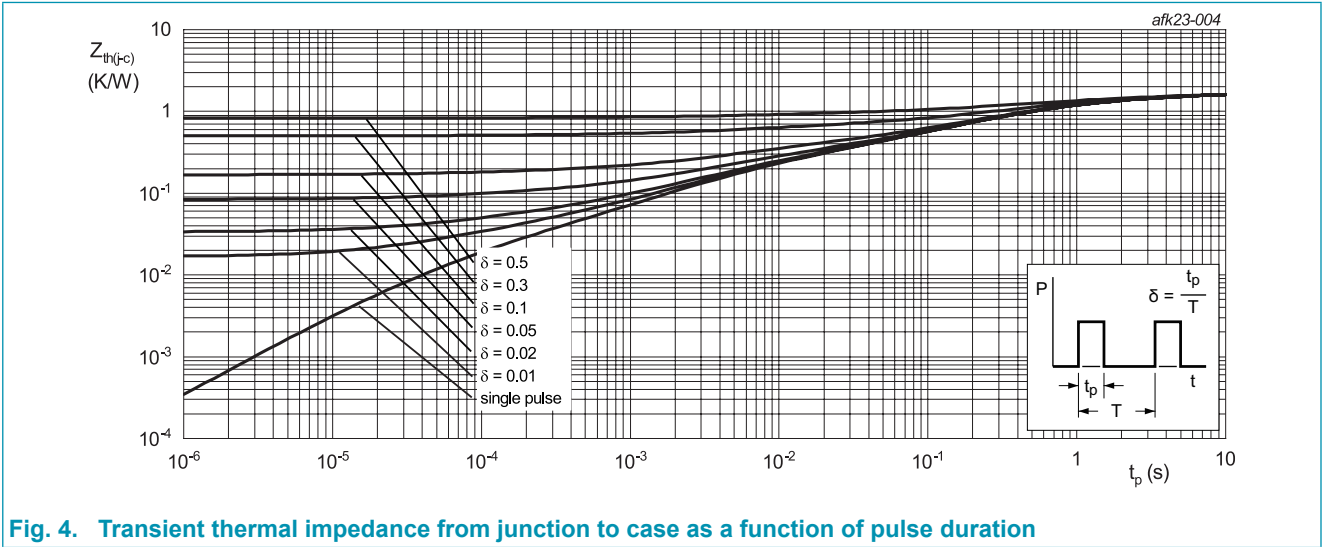
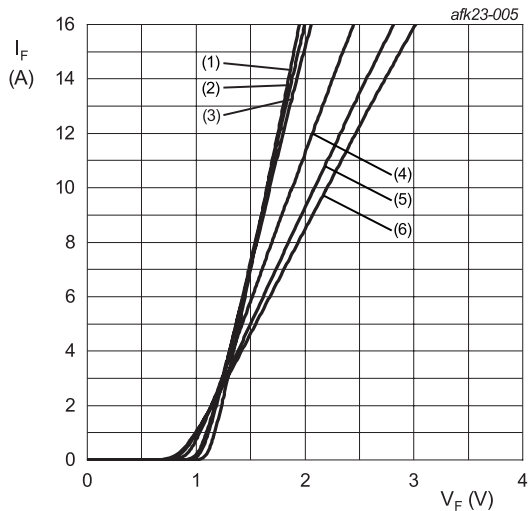


Fig. 4. Transient thermal impedance from junction to case as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

| Symbol                  | Parameter                       | Conditions                                                                                                                   |  | Min | Typ  | Max  | Unit |
|-------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| Static characteristics  |                                 |                                                                                                                              |  |     |      |      |      |
| V <sub>F</sub>          | forward current                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>                                                         |  | -   | 1.5  | 1.7  | V    |
|                         |                                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 5</a>                                                        |  | -   | 1.8  | 2.1  | V    |
|                         |                                 | I <sub>F</sub> = 8 A; T <sub>j</sub> = 175 °C; <a href="#">Fig. 5</a>                                                        |  |     | 1.95 | 2.25 | V    |
| I <sub>R</sub>          | reverse current                 | V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                                                       |  | -   |      | 50   | μA   |
|                         |                                 | V <sub>R</sub> = 650 V; T <sub>j</sub> = 175 °C; <a href="#">Fig. 6</a>                                                      |  | -   |      | 200  | μA   |
| Dynamic characteristics |                                 |                                                                                                                              |  |     |      |      |      |
| Q <sub>r</sub>          | recovered charge                | I <sub>F</sub> = 8 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a> |  | -   | 13   | -    | nC   |
| C <sub>d</sub>          | diode capacitance               | f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C                                                                      |  | -   | 267  | -    | pF   |
|                         |                                 | f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C                                                                    |  | -   | 37   | -    | pF   |
|                         |                                 | f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C                                                                    |  | -   | 36   | -    | pF   |
| E <sub>as</sub>         | non-repetitive avalanche energy | I <sub>R</sub> = 4.9 A; L = 5 mH; T <sub>j(init)</sub> = 25 °C                                                               |  | 60  | -    | -    | mJ   |



$V_o = 1.108\text{ V}$ ;  $R_s = 0.1198\text{ }\Omega$

- (1)  $T_J = -55\text{ }^\circ\text{C}$ ; typical values
- (2)  $T_J = 0\text{ }^\circ\text{C}$ ; typical values
- (3)  $T_J = 25\text{ }^\circ\text{C}$ ; typical values
- (4)  $T_J = 100\text{ }^\circ\text{C}$ ; typical values
- (5)  $T_J = 150\text{ }^\circ\text{C}$ ; typical values
- (6)  $T_J = 175\text{ }^\circ\text{C}$ ; typical values

Fig. 5. Forward current as a function of forward voltage; typical values

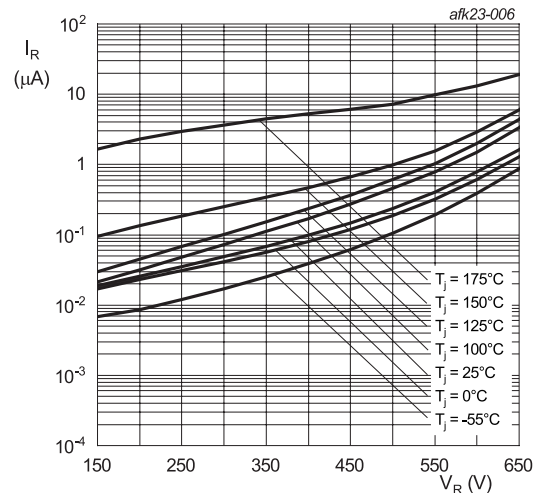


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

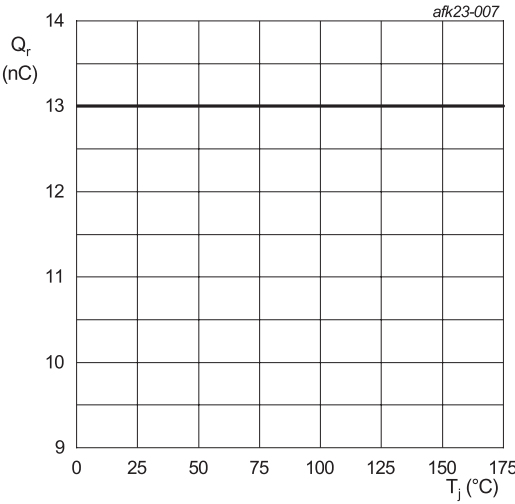
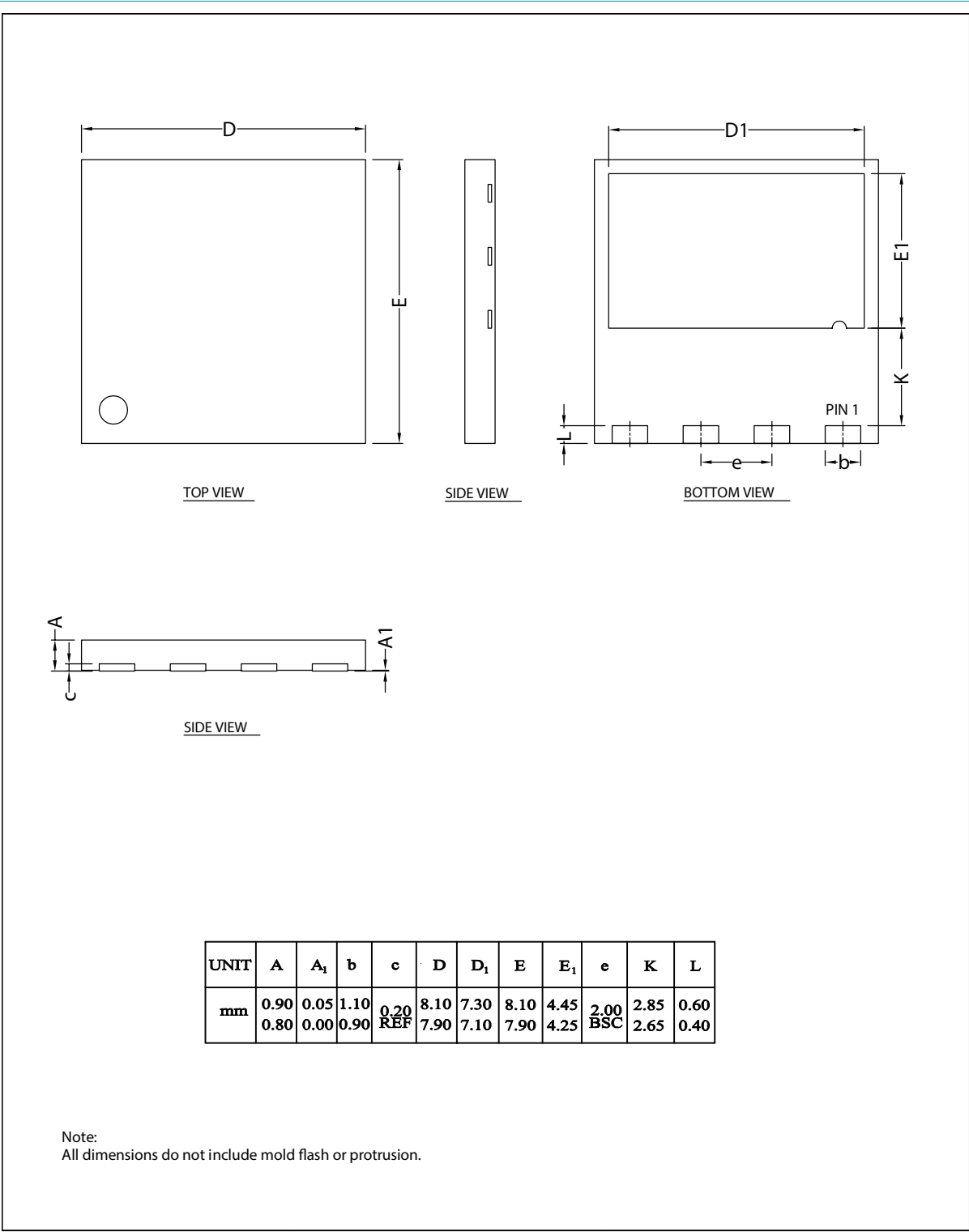


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline



## 12. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | Definition                                                                            |
|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
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- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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